

Applying GIS Components to the Internet

Liu Zhen Wang Xiaoli

Department of Cartography and Geographic Information Engineering,

Zhengzhou Institute of Surveying and Mapping

450052 CHINA

E-mail: luu@public.zz.ha.cn

ABSTRACT: With the strong development of the technologies of computer networks, the technology of using Geographic Information System (GIS) through the internet (That is WebGIS) is making great progress too. A way of Approaches to the reality of WebGIS is Using Active Server Page (ASP) technology combining with GIS components, which has been developing rapidly. Browser\Server (B\S) structure is mainly adopted by this WebGIS technology, which needs only a connection to the Internet with a web browser without using any GIS software for an Internet user. In this paper, we will mainly discuss two topics on combining with GIS components and web page, which are listed below: Technology of GIS components; the method of integrating GIS components with Internet.

Developing WebGIS software is an important way to make use of Internet/Intranet. Using Active Server Page (ASP) technology combining with GIS components is adopted by us. In this paper, we will firstly introduce the main content of WebGIS, and then detail some topics of WebGIS respectively.

KEYWORD: WebGIS, VBScript, ASP

1. Introduction

The conception and content of GIS is enlarging and deepening with the development of multi-subjects, especially computer science and spatial analyze theory, after it was brought out by Canadian F.Tomlinson and American Duane F.Marble in the 60th, 20th century. GIS is a computer system mainly for collecting, storing, managing, and presenting geographic information. GIS can present and analyze reality world, and is a tool for geographic data processing and analyzing. As a modern science method of from qualitative integration to quantitative integration, GIS is showing its more and more importance on research of harmonize development between human and nature. As distributing, opening, and integration that geographic information has, the development of GIS is on the way of opening, distributing, and

collaboration. GIS is changing to an important tool for people to understand and rebuild reality world.

The Internet is a collection of computer networks that connects millions of computers around the world. The World Wide Web is a client/server technology used to access a vast variety of digital information from the Internet. Using a software client called a Web browser, such as Microsoft Internet Explorer, and a modem or other connection to an Internet Service Provider (ISP), you can easily access text, graphics, sound, and other digital information from practically any computer in the world that is running the appropriate server software on the Internet. As a result of abundant digital information on Internet, Internet is attracting more and more people all around world, and is influencing and changing world people's normal life.

As important technological method that people understand and rebuild world or great effect for people's normal life, GIS and Internet are inevitably integrated into together, that is WebGIS. So it is very important task for researcher that how can integrate GIS with Internet perfectly, and how can use huge information resource of Internet in GIS. The content below is mainly about development technology of GIS component and its integration with Internet.

2. Technology of GIS components

At present, from the appearance of GIS application, it mainly has three types: Firstly, stand-alone edition. All parts of application are installed into a stand-alone computer system. This type has now been more and more mature and perfect in spite of software design or theory or method of computation; secondly, component GIS. Application is divided into many parts, and each part is a comparatively independent component which packages part of GIS application. So we can take component GIS as various components which package all function of GIS. This type is now developing rapidly, and is very useful in large scale. In other world, GIS components are the leading technology at present.

The development process of GIS component is part of WebGIS application which is mainly composed of four steps listed below:

• Requirement analyze

At the beginning of developing WebGIS application, we should build requirement for it. According as business needs that user wants system to be, we should build business level, and then system level, and then release level requirement. During this process, we can describe them depending on software engineering method, such as use case diagram, activity diagram, interaction diagram, etc. The figure 2-1 demonstrates part of system requirement by use case diagram:

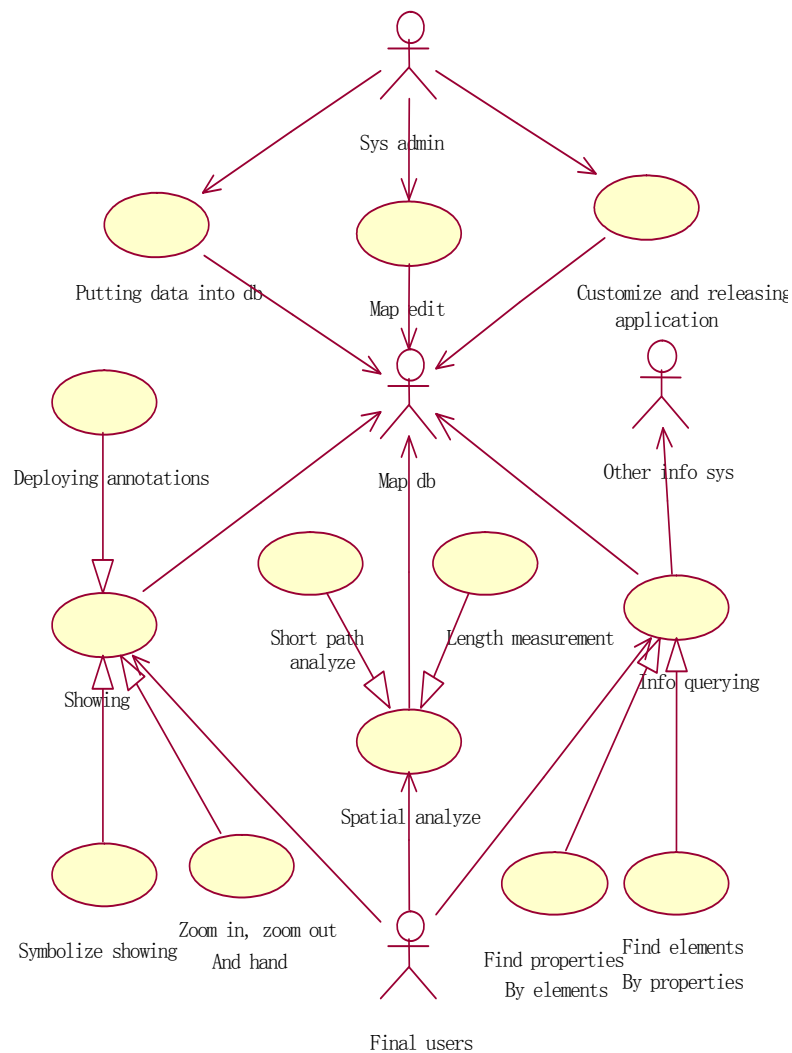


Figure 2-1 System use case diagram

• Software design

System's software design composes of two phrases: architectural design and detail design. For system's architectural design, four parts are given to describe

system. Figure 2-2 expresses them and their relationship.

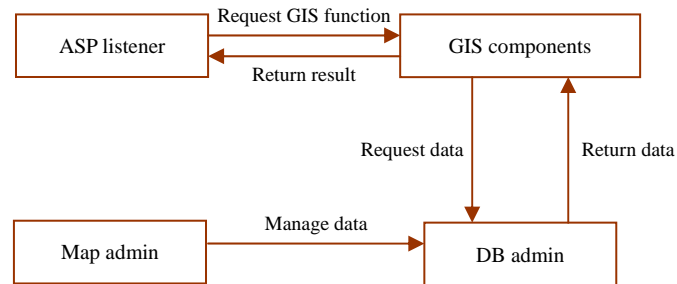


Figure 2-2 System architecture

It is for system's detailed design that extends and details architecture design by class diagram, sequence diagram, etc. System's detailed functions and relationships between parts are all shown and regulated.

- **Code**

Result of system coding is converting detailed design to software codes in programming language, such as Visual C++. Executable program is necessary product for system coding.

- **System test**

Examining and testing functions and performance of software we have got is goal of system test. Perhaps we may return to first step to restart our works once or more for system's better performance.

In release version of WebGIS, all GIS functions are packaged into one ActiveX control and more than twenty automation objects. They have many advantages such as independence of programming language, strong reusable, high executive efficiency, easy applying to Internet/Intranet, and showing object oriented thinking.

3. The method of integrating GIS components with Internet

Development technology on Internet can have about five types such as DHTML, delivering content to the web, component development, Internet tool & technology, and component library, etc. We mainly adopt two method (DHTML and component development) for integration GIS with Internet. Types of integration GIS with Internet

mainly have three: Client/Server mode, Browser/Server mode, and add-in mode. The mode we adopted is Browser/Server mode. Figure 3-1 shows system's mode. In figure 3-1, it is Internet/Intranet that implements the connection between browser and server.

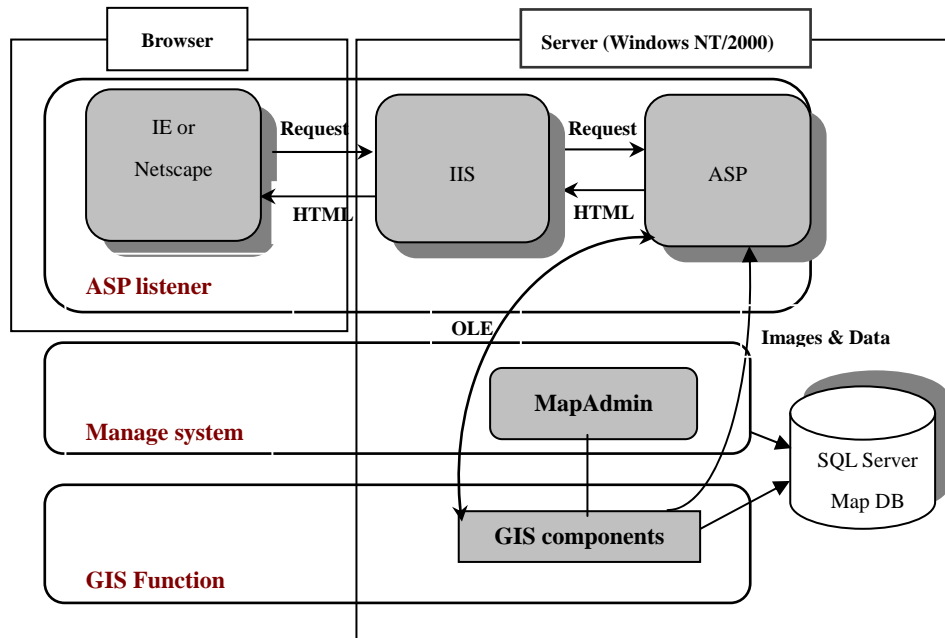


Figure 3-1 Browser/Server mode WebGIS

From IIS 3.0, Active Server Pages, which is ASP, has been produced by Microsoft. ASP can achieve organic integration between HTML pages, script language (VBScript, Jscript), and ActiveX controls. With ASP, we can create powerful server side application with dynamic, more efficient web pages, and web database. ASP can access the properties and methods of the ASP build-in objects. TheObjectContext object exposes methods that return an interface to one of the ASP built-in objects. Custom component can use these interfaces to access the methods and properties of the built-in objects. What's more, we can use our own GIS components in ASP files through the creation of GIS components' objects.

Usually, when a user sends a GIS function request through ASP page, ASP page translates this request to server side, GIS components are revoked for the completion of this function, and then ASP pages translate request result that GIS components produce to user's browser. Finally, this user can see the result he wanted.

Figure 3-2 shows GIS Components using sequence while a user invokes GIS

function through browser.

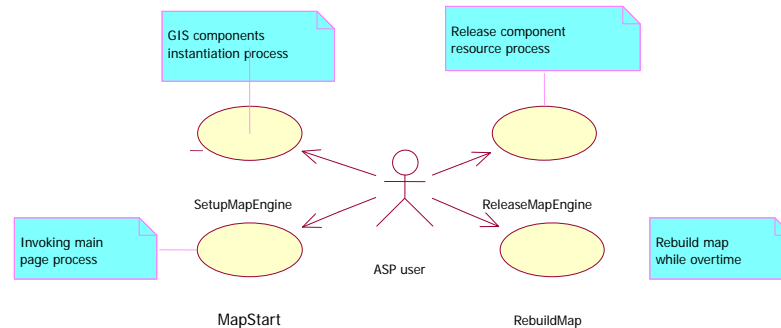


Figure 3-2 GIS components using sequence

4. Conclusion

Through the structure of “ASP + IIS + GIS components + database”, we can integrate GIS components with Internet very well. System can provide users with abundant GIS functions as well as much lower demand for user side computer platform. Most of GIS function tasks are spend short time. But this system structure have some shortcut such as high burden to server, none graphics mode for user side map, etc.

More works for system’s performance improvement is to be done in future. What’s more, integration with other types’ WebGIS can reduce its shortcut and change to be better.

Reference

- [1] **MapNotes’ Design and Implementation** *Deng Shujun Master’s thesis* Jun. 01, 2001
- [2] **MSDN Library Visual Studio 6.0** *Microsoft Corp.*
- [3] **Realizing Directories and files Browser in Web Pages through ASP** *Zhou Yangping* <http://www.asp101.com>
- [4] **The Studies on the Architecture of Web-GIS** *Peisheng Zhao Chongjun Yang* <http://www.asptoday.com>